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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,893	01/05/2004	Fuja Shone	LEE.002	2078
20987	7590	07/07/2005	EXAMINER	
VOLENTINE FRANCOS, & WHITT PLLC ONE FREEDOM SQUARE 11951 FREEDOM DRIVE SUITE 1260 RESTON, VA 20190			VU, DAVID	
			ART UNIT	PAPER NUMBER
			2818	

DATE MAILED: 07/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/750,893

Applicant(s)

SHONE, FUJA

Examiner

DAVID VU

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) 1-17, 31 and 32 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-32 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01/05/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 01/05/04.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### Election/Restrictions

1. Applicant's election without traverse of Embodiment I (Claims 18-30) on 06/16/2005 is acknowledged.

Claims 1-17 and 31-32 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 06/16/2005.

### Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 18-30 are rejected under 35 U. S. C. 102(b) as being anticipated by Chang et al. (US Pat. 6,486,028, herein after Chang).

Regarding claims 18, 22, 23, 24 and 25, Chang discloses in figs. 1-6 a non-volatile memory array having vertical transistors, wherein at least one of the vertical transistors is formed in a trench of a semiconductor substrate and comprises an N<sup>+</sup>-type first doping region 108 being

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underneath the bottom of the trench; an N<sup>+</sup>-type second doping region 104/106 being beside the top of the trench; wherein the first and second doping regions functions as bit lines for the non-volatile memory array; a ONO gate dielectric layer 110/112/114 formed on the first doping region 108, the second doping region 104/106 and the sidewall of the trench, wherein the gate dielectric layer comprises at least one nitride film 112; and polysilicon plug 116 formed in the trench.

Regarding claim 19, Chang discloses the semiconductor substrate is constituted of a silicon substrate 100 and a mask layer 110/112/114 (col. 3, lines 53 through col. 4, line 21).

Regarding claim 20, Chang discloses the mask layer 110/112/114 is selected from the group of silicon nitride, silicon oxide, silicon oxynitride and multi-layer thereof (col. 3, lines 53 through col. 4, line 21).

Regarding claim 21, Chang discloses the mask layer 110/112/114 is of a thickness between 300 to 365 angstroms (col. 3, lines 53 through col. 4, line 21).

Regarding claim 26, Chang discloses the at least one of the vertical transistors further comprises insulation blocks 110/112/114 formed on the surfaces of the first and second doping regions 108/104/106 (fig. 5).

Regarding claim 27, since insulation layers 110/112/114 in Chang is formed under the same conditions (rapid thermal oxidation/RTCVD) as taught in the present invention, then the insulation layer should possess the same properties (i.e. - the edge insulation layers formed on sidewalls of the trenches, and the insulation blocks are thicker than the edge insulation layers).

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Regarding claim 28, Chang discloses the at least one of the vertical transistors further comprises a third region (channel regions) of a second conductive type beside the trench (col. 3, lines 31-37 and col. 4, lines 43-47).

Regarding claim 29, Chang discloses the at least one of the vertical transistors further comprises a fourth doping region (channel regions) of the first conductive type beside the trench, and the third doping region (channel regions) is located higher than the fourth doping region (channel regions) (col. 3, lines 31-37 and col. 4, lines 43-47).

Regarding claim 30, Chang discloses the first doping regions of the vertical transistors are connected as one of a common source and a common drain (col. 3, lines 38-52).

### **Conclusion**

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Vu whose telephone number is (571) 272-1798. The examiner can normally be reached on Monday-Friday from 8:00am to 5:00pm. If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR, Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

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system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David Vu

July 06, 2005.